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In a series of two previous experiments, sunflower meal with additions of lysine and methionine had been shown to supplement corn to support a high rate of egg production. The present work was conducted to determine the efficacy of sunflower meal in replacing parts or all of the soybean meal in 16 or 14% protein diets for laying hens with methionine and with and without lysine supplementation.

As shown in Table 1, corn-based layer diets were formulated using five combinations of soybean-to-sunflower meal to provide 100:0, 75:25, 50:50, 25:75 and 0:100 % ratios of each. Methionine and lysine supplements were added to the 14% protein diets to provide the NRC (1977) requirements. However, the 16% protein diets were either supplemented with methionine and lysine or methionine alone to determine the necessity for lysine additions as sunflower meal replaced soybean meal. Therefore, the study was a 3 x 5 factorial one initially, using five replicates of 12, 27-week old birds per treatment.

The overall egg production rate, feed consumption, feed efficiency, egg weight, mortality, body weight change or Haugh Unit data for 13, 28-day periods were not significantly affected by either protein source or dietary protein level (Table 2). Neither were there any significant interactions between the factors studied. The results of this study indicate that sunflower meal can replace parts or all of the soybean meal when lysine and methionine contents are adjusted according to the NRC (1977) requirements. Furthermore, 14% protein diets supplemented with lysine and methionine provided a balance of amino acids for laying hens that supported egg production rates comparable to that from feeding 16% protein diets.

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Table 1. Composition of Diets Containing Various Ratio of Soybean Meal to Sunflower Meal

	Soybean meal protein:Sunflower meal protein									
	100:0		75:25		50:50		25:75		0:100	
	dietary protein level (%)									
Ingredient	16	14	16	14	16	14	16	14	16	14
Ground corn	66.1	71.0	64.6	70.5	62.5	69.5	60.5	67.0	58.0	66.0
Soybean meal (48%)	21.4	16.0	16.2	12.2	10.9	8.2	5.6	4.2	--	--
Sunflower meal	--	--	6.2	4.7	12.6	9.3	19.4	14.4	26.0	19.5
Dehydrated alfalfa	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Dicalcium phosphate	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Limestone	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Yellow grease	--	--	0.5	--	1.5	0.5	2.0	1.0	3.0	2.0
Vitamin premix	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Salt premix	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lysine[a]	--	--	0.06	0.06	0.13	0.1	0.19	0.15	0.26	0.19
Methionine	--	--	0.02	0.01	0.05	0.04	0.08	0.05	0.08	0.06
Calculated analysis										
ME, Kcal/kg	2738	2782	2720	2746	2740	2756	2697	2707	2637	2739
Crude fiber, %	2.4	2.4	3.1	2.9	3.8	3.4	4.6	4.0	5.3	4.5
Lysine[b], %	0.83	0.67	0.75	0.67	0.67	0.64	0.58	0.63	0.49	0.61
Methionine + cystine, %	0.58	0.51	0.58	0.51	0.58	0.51	0.58	0.51	0.58	0.51
Tryptophan, %	0.21	0.18	0.21	0.18	0.20	0.17	0.20	0.17	0.19	0.17
Isoleucine, %	0.84	0.72	0.83	0.71	0.81	0.70	0.81	0.70	0.79	0.69
Leucine, %	1.56	1.41	1.51	1.39	1.45	1.32	1.41	1.30	1.33	1.26
Valine, %	0.86	0.73	0.81	0.69	0.74	0.65	0.68	0.60	0.61	0.55

[a] Lysine supplements were left out of all the 16% protein diets of one series for comparison.

[b] Lysine values for 16% protein series does not include supplemental lysine.

Table 2. Performance of Hens as Affected by Sunflower Meal or Protein Level

	% hen-day production	Daily feed intake	Feed/ doz	Egg wt	Final body wt	Mortality (%)	Haugh Units
		gm	kg	gm	kg		
Soybean:sunflower meal							
100:0	71.0	117	2.1	63.1	1.69	4.6	79
75:25	70.2	119	2.1	63.5	1.69	5.1	78
50:50	70.6	118	2.1	63.7	1.68	5.0	78
25:75	70.7	119	2.1	63.0	1.65	6.3	79
0:100	72.6	120	2.0	62.3	1.65	6.3	79
Protein level							
16% + methionine	71.2	121	2.1	63.4	1.68	4.9	79
16% + methionine + lysine	71.3	118	2.1	63.3	1.67	5.2	78
14% + methionine + lysine	70.5	118	2.1	62.7	1.67	6.4	79